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Improving microwave single photon detection efficiency with shaped photon capture[1] A. NARLA, S. SHANKAR, S.O. MUNDHADA, J. VENKATRAMAN, W. PFAFF, L. BURKHART, C. AXLINE, L. FRUNZIO, R.J. SCHOELKOPF, M.H. DEVORET, Department of Applied Physics, Yale University — Traveling single microwave photons are an invaluable resoure as carriers of quantum information between remote systems but efficiently detecting these single microwave photons can be challenging. One demonstrated microwave photo-detector is based on a 3D qubit-cavity system where single photons are detected by applying a number-selective pi-pulse on the qubit, exciting it only when a single photon is present inside the cavity. The efficiency of this detector is ultimately limited to about 50% because the cavity is not mode-matched to perfectly absorb the photon. We present one approach to increasing the detection efficiency that relies on driving a two-photon transition to capture the incident photon. We will discuss simulations and experimental results in a part of a system that robustly generates entanglement between distant superconducting qubits.

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